

A New Species of Flathead, *Grammoplites knappi* (Scorpaeniformes: Platycephalidae) from the South China Sea

Hisashi Imamura^{1,3} and Kunio Amaoka²

¹Iai Girls' High School, 23-11 Suginami-cho, Hakodate, Hokkaido 040, Japan

²Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University,
3-1-1 Minato-cho, Hakodate, Hokkaido 041, Japan

³Present address: Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University

(Received June 24, 1993; in revised form April 22, 1994; accepted June 7, 1994)

Abstract A new platycephalid, *Grammoplites knappi*, is described from specimens from the South China Sea (off Sarawak, Borneo Island, the Gulf of Thailand and Hainan Island, China). The species is distinguished from other species of *Grammoplites* by the following combination of characters: 5 or fewer gill rakers on the lower arch, narrow interorbit, large eye diameter, short uppermost preopercular spine, no papillae on lips, small body scales and pored lateral line scales with posteriorly-positioned ctenii and a single exterior opening on the posterior margin. A key to the five species of *Grammoplites* is presented.

The platycephalid genus *Grammoplites* is characterised by each lateral line scale having a distinct spine anterior to the ctenii (Fowler, 1904). Four species have been included in *Grammoplites*: *G. scaber* (Linnaeus, 1758), from Madagascar, India and Singapore to Taiwan, *G. suppositus* (Troschel, 1840), from the Red Sea to Sri Lanka, *G. gruveli* (Pellegrin, 1905), from the west coast of Africa, and *G. portuguesus* (Smith, 1953), from Durban to Beria (*G. jacksoni* Fowler, 1944 is a junior synonym of *Cociella crocodila*, according to L. W. Knapp in Böhlke [1984]). Recently, a single specimen of a new species of *Grammoplites* was discovered among bottom fishes trawled off Sarawak, Borneo, in the South China Sea, by the T/V "Oshoro Maru" during a training cruise in December 1970, under the auspices of the Faculty of Fisheries, Hokkaido University. Additional examples of this species were subsequently found among other collections, from Hainan Island, China (collected in 1932) and the Gulf of Thailand (collected in 1960-1961 by the Naga Expedition, and 1991).

The new species differs from those previously described in having a smaller number of gill rakers, narrower interorbit, larger eye diameter, shorter uppermost preopercular spine, no lip papillae, smaller body scales, and a single exterior opening and ctenii on the posterior margin of each lateral line scale. This paper describes this species, thereby making the name available, and provides a key to the species of

Grammoplites.

Material and Methods

Counts and measurements were made according to Hubbs and Lagler (1958), specimen lengths being expressed as standard length (SL). Measurements were made with calipers to the nearest 0.1 mm. Vertebral counts were taken from radiographs. Names of spines and ridges on the head follow Knapp (1986). The type specimens were deposited in the California Academy of Sciences (CAS), Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University (HUMZ), National Science Museum, Tokyo (NSMT), Department of Marine Sciences, University of the Ryukyus (URM), and United States National Museum of Natural History (USNM). Other institutional abbreviations are as follows: Division of Fisheries, University Museum, University of Tokyo (FUMT) and The Natural History Museum (BMNH).

Grammoplites knappi sp. nov. (Figs. 1-3)

Holotype. HUMZ 109614, 210.1 mm SL, female, off Sarawak, Borneo Island, depth unknown, 1-8 Dec. 1970.

Paratypes. CAS 80623, 3 specimens, 190.2-207.9 mm

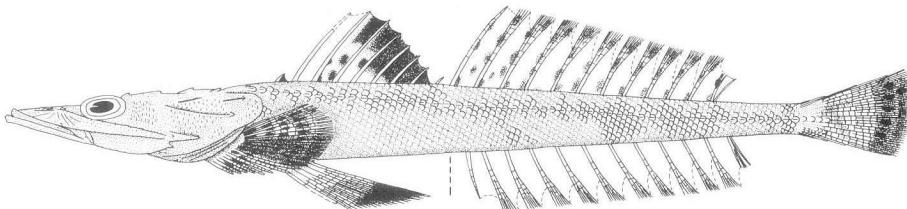


Fig. 1. Lateral view of *Grammoplites knappi* sp. nov., holotype, HUMZ 109614, female, 210.1 mm SL, off Sarawak, Borneo Island.

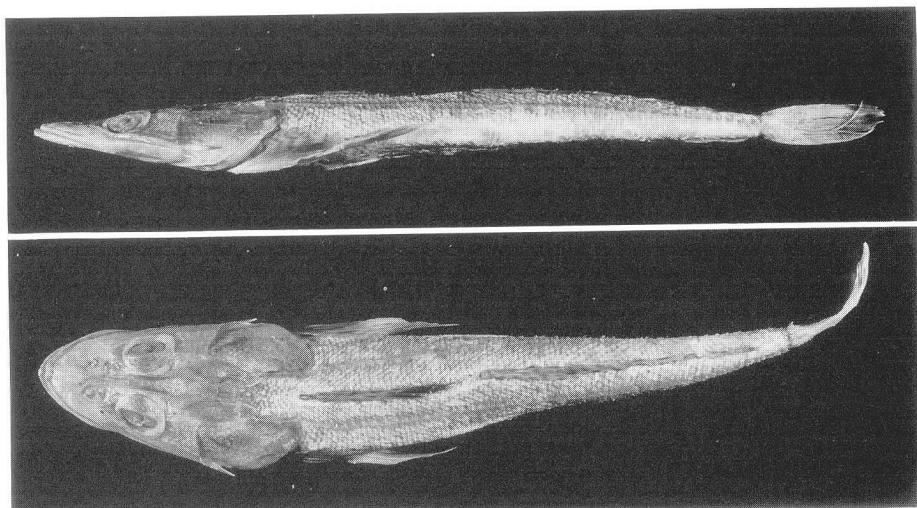


Fig. 2. Photographs of lateral view (upper) and dorsal view (lower) of *Grammoplites knappi* sp. nov., holotype, HUMZ 109614, female, 210.1 mm SL, off Sarawak, Borneo Island.

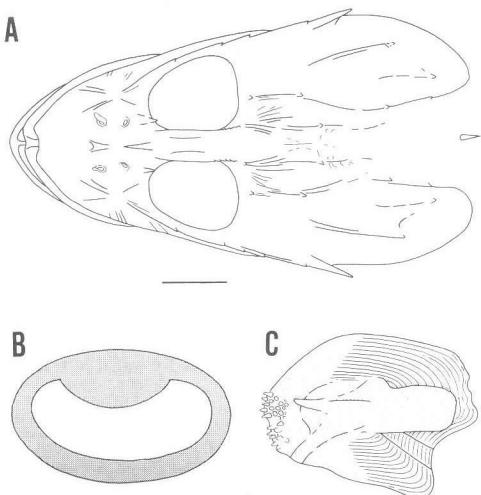


Fig. 3. Holotype of *Grammoplites knappi* sp. nov.
A) Dorsal view of head; B) iris lappet of right eye; C) scale from middle portion of lateral line on right side. Scale bars indicate 10 mm (A) and 5 mm (B and C).

SL, Gulf of Thailand ($12^{\circ}15'00''N$, $100^{\circ}16'00''E$), ca. 24–26 m, 6–9 Aug. 1960; CAS 80624, 2 specimens, 216.7–227.2 mm SL, Gulf of Thailand ($12^{\circ}39'25''N$, $100^{\circ}15'45''E$), 33 m, 13 Dec. 1960; HUMZ 128622–128624, 3 specimens, 203.3–224.6 mm SL, acquired from a fish processing factory, Pak-nam, Bangkok, Thailand, 29 Aug. 1991; NSMT-P 45836–35838, 3 specimens, 196.1–214.2 mm SL, acquired from a fish processing factory, Pak-nam, Bangkok, Thailand, 21 Aug. 1991; URM-P 29670, 29678, 29691, 3 specimens, 169.7–216.9 mm SL, collected with HUMZ 128622–128624; USNM 324970, 216.2 mm SL, acquired from a fish market, Bangkok, collected from the Gulf of Thailand ($12^{\circ}09'N$, $100^{\circ}21'E$ – $12^{\circ}18'N$, $100^{\circ}22'E$), 7–11 Apr. 1961; USNM 327280, 187.5 mm SL, Gulf of Thailand ($12^{\circ}39'15''N$, $100^{\circ}15'45''E$), 33 m, 13 Dec. 1960.

Notypes. CAS 134032, 143.0 mm SL, Hainan Island, China, 1932; URM-P 29669, 29671–29674, 29677, 29679–29683, 29686, 29688–29689, 14 specimens, 182.2–235.0 mm SL, collected with NSMT-P 45836–45838.

Diagnosis. A species of *Grammoplites* with a low number of gill rakers ($1+4-5=5-6$, usually $1+5=6$), narrow interorbital width (6.4–8.4% head length [HL]), large eye diameter (18.6–20.7% HL), short

uppermost preopercular spine not extending to posterior margin of opercle, no lip papillae, small body scales (number of scale rows slanting forward and downward above lateral line about twice that of lateral line scales), and lateral line scales with a single exterior opening and ctenii on the posterior margin.

Description. Data for the holotype are presented first, followed by paratype data in parentheses: dorsal fin rays I–VII–I–12 (I–VII–I–12 in two, I–VIII–12 in 13, I–IX–12 in one); anal fin rays 12 (12); pectoral fin rays 2 (unbranched) + 12 (branched) + 7 (unbranched) = 21 (2 + 10 – 13 + 6 – 9 = 20 – 22); pelvic fin rays I, 5 (I, 5); branched caudal fin rays 6 (upper) + 6 (lower) (6 + 5 – 6); vertebrae 27 (27); gill rakers 1 + 5 = 6 (1 + 4 – 5 = 5 – 6, usually 1 + 5 = 6); scales in lateral line 53 (all scales with a distinct, backwardly directed spine) (51–54). Proportional measurements are given in Table 1.

Body depressed and elongated, width 6.0 (5.5–7.1) in HL and depth 11.2 (9.1–13.3) in HL, mostly covered with ctenoid scales (those on dorsum deciduous), some cycloid scales on under surface. Head flattened, length 2.9 (2.8–3.2) in HL, exposed bony surface armed with ridges and small spines (Fig. 3).

A). Snout slender, longer than eye diameter, 3.4 (3.3–3.6) in HL. Iris lappet simple, broad (Fig. 3B). No papillae on eye. Interorbital concave, width a little more than one-third orbit diameter, 14.1 (12.1–15.7) in HL. Top and sides of head armed with spines and fine ridges. Nuchal ridge high, a rudimentary spine anteriorly and a stout spine posteriorly. Opercle armed with two moderate spines, upper extending slightly beyond last nuchal spine, lower with a distinct ridge lacking serrations. Preopercle armed with three spines, uppermost longest, its length about equal to two-thirds orbit diameter, not reaching posterior margin of opercle and bearing a small supplementary spine; lowermost smallest, almost embedded in skin. Parietal ridge low, armed with a single spine in middle. Lateral surface of head with two ridges, upper (suborbital ridge) armed with four (right side) and three (left side) small, blunt spines, lower (ventral edge of suborbital bones) not serrated. Preorbital, nasal and lachrymal spines absent. A sharp, stout preocular spine in front of eye. Supraorbital ridge with rough serrations on posterior half. A single stout but very low postocular spine. Pterotic ridge with a small spine at the end. Supraoccipital ridge low, lacking spines. Interopercular flap absent. Maxilla not reaching middle of eye, length 2.6 (2.5–

Table 1. Proportional measurements of *Grammoplites knappi* sp. nov.

	Holotype (HUMZ 109614)	Paratype (n = 16)
Standard length (mm)	210.1	169.7–227.2
% of standard length		
Head length	34.3	31.6–35.5
Body depth	8.9	7.5–11.0
Body width	16.6	14.2–18.2
% of head length		
Snout length	29.5	27.9–30.0
Eye diameter	19.0	18.6–20.2
Interorbital width	7.1	6.4–8.3
Upper jaw length	38.8	37.1–39.4
Lower jaw length	54.9	52.5–55.3
Predorsal length	98.8	96.4–100.7
Depth of caudal peduncle	9.4	8.8–10.7
Length of first dorsal fin base	59.8	51.7–67.2
Length of second dorsal fin base	96.1	87.2–106.4
Length of anal fin base	98.2	89.6–107.5
Length of first dorsal fin spine	5.0	4.0–6.6
Length of second dorsal fin spine	—	30.8–37.5
Length of first dorsal fin ray	35.4	26.2–40.0
Length of first anal fin ray	17.1	15.5–19.7
Pectoral fin length	32.5	30.2–34.6
Pelvic fin length	56.7	53.1–60.8
Caudal fin length	43.4	40.8–50.5

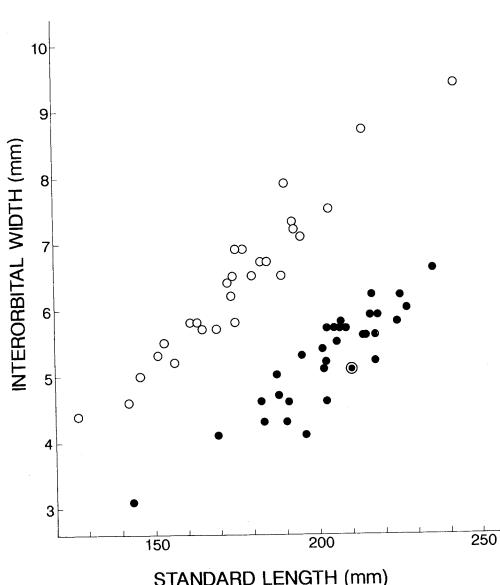


Fig. 4. Relationship between interorbital widths of *Grammoplites knappi* sp. nov. (●), *G. scaber* (○) and holotype of *G. knappi* (◎).

2.7) in HL. Villiform teeth in broad bands on jaws and palatine, in two separate patches on vomer. Teeth band on upper jaw without a notch. No papillae on lips. All scales in lateral line with a distinct spine (Fig. 3C). Pored scales in lateral line with a single, exterior opening. Body scales small, number of oblique scale rows slanting backward and downward above lateral line about equal to that of lateral line scales, and slanting forward and downward above lateral line about twice latter. First dorsal fin originating slightly behind head. First and second dorsal fins separated, a small free spine between them (free spine absent in 14 paratypes). Pelvic fin short, not reaching anus, its length 1.8 (1.7–1.9) in HL. Caudal fin slightly rounded posteriorly, length 2.3 (2.0–2.5) in HL.

Colour in ethanol.—In the holotype, head and upper surface of body light brown, lower surface pale. First dorsal fin with a broad, blackish band on distal half and indistinct dark spots anteriorly on basal half. Second dorsal fin with dark spots. Caudal fin with two dark band posteriorly, anterior band comprising several spots. Pectoral fin with several dark vertical bands comprised of small spots, middle portion light brown, upper and lower pale. Pelvic fin light basally, blackish posteriorly. Anal fin pale. In the paratype, caudal fin with a broad dark

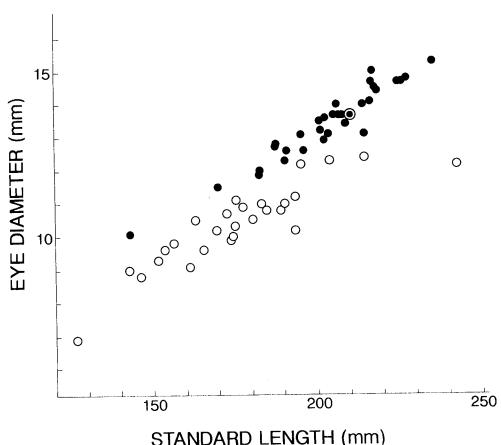


Fig. 5. Relationship between eye diameters of *Grammoplites knappi* sp. nov. and *G. scaber*. Symbols as in Figure 4.

band posteriorly, sometimes with darker irregular spots. Pectoral fin with or without several dark bands comprised of small spots, middle light brown or brown, upper and lower pale. Pelvic fin light brown or pale basally, blackish posteriorly. Remaining fins and body similar to holotype.

Colour when fresh (based on colour photographs of NSMT-P 45836).—Head brown. Body brown dorsally, with four dark vertical bands. Second dorsal fin white, with dark spots. Caudal fin yellow, with a broad dark band posteriorly. Pectoral fin with several vertical brown bands comprised of small spots, middle portion brown, upper yellow, and lower white. Pelvic fin yellow, posteriorly blackish. Anal fin white. (First dorsal fin unclear from photograph.)

Distribution. Known from the South China Sea (off Sarawak, Borneo Island, the Gulf of Thailand and Hainan Island, China).

Etymology. Named in honor of the platycephalid systematist, Dr. Leslie W. Knapp.

Remarks. The genus *Grammoplites* (type-species *Cottus scaber* Linnaeus, 1758) was established by Fowler (1904) on the basis of all scales in the lateral line having a distinct spine. *G. knappi*, which is similarly characterised and thus assigned to *Grammoplites*, is distinguished from congeneric species, except *G. scaber*, in having fewer gill rakers on the lower arch (5 or fewer vs. 7 or more). It differs from

New Platycephalid

Table 2. Comparison of *Grammopilus knappi* and four known species of *Grammopilus*

	<i>G. knappi</i> <i>n</i> = 32	<i>G. scaber</i> <i>n</i> = 27	<i>G. suppositus</i> <i>n</i> = 28	<i>G. portugesus</i> (holotype)	<i>G. grisei</i> <i>n</i> = 3
SL (mm)	143.0–224.6	138.8–214.3	70–202	133	106.4–132.8
Gill rakers	1+4=5=5–6 (usually 1+5=6)	1=4=6=5–7 (usually 1+5=6)	2+7=9	2+9=11	1+7=8
Interorbital width (% of HL)	6.4–8.4	9.8–13.1	—	—	—
Eye diameter (% of HL)	18.6–20.7	16.3–19.1	—	—	—
Position of preopercular spine relative to opercle	not reaching posterior margin	reaching beyond posterior margin	not reaching posterior margin	not reaching posterior margin	not reaching posterior margin
Papillae on lips	absent	absent	absent	absent	absent
Number of scale rows slanting forward and downward above lateral line	about twice number of lateral line scales	about twice number of lateral line scales	one	one	two
Number of exterior openings in lateral line scales	—	—	—	—	—
Posterior ctenii on lateral line scales	present	present	—	—	absent
Source	present study	present study	Knapp (1979)	Smith (1953)	present study

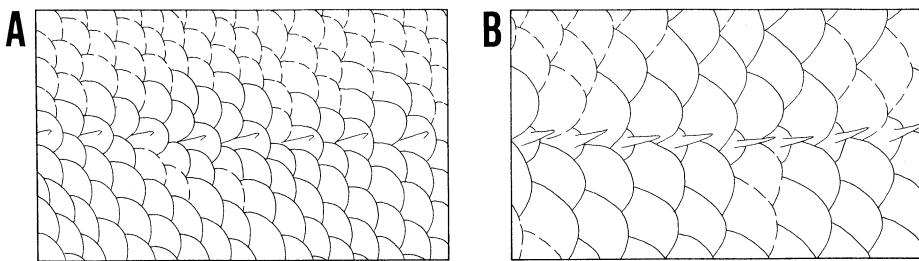


Fig. 6. Dorsal view of scales on midbody on left side. A) *Grammoplites knappi* sp. nov., paratype, HUMZ 128622, 191.2 mm SL; B) *G. gruveli*, BMNH 1914.2.2, 119.0 mm SL (lateral line scales number 8 in both figures). Scales bars indicate 5 mm.

G. scaber in having a narrower interorbital (width 6.4–8.4% of HL vs. 9.8–13.1%) (Fig. 4). Moreover, although a partial overlap in eye diameter range occurs between *G. knappi* and *G. scaber* (length 18.6–20.7% of HL and 16.3–19.1%, respectively), the former has a larger eye diameter at comparable sizes (Fig. 5). *G. knappi* differs from *G. suppositus* in having a shorter preopercular spine (not reaching the posterior margin of the opercle vs. reaching beyond the latter), from *G. portuguesus* in lacking papillae on the lips, and from *G. gruveli* in having smaller body scales (the number of scale rows slanting forward and downward above the lateral line being about twice that of the lateral line scales vs. about equal numbers) (Fig. 6) and pored scales in the lateral line with one exterior opening (vs. two openings) and posterior ctenii (vs. ctenii absent) (Figs. 3C and 7). Matsubara and Ochiai (1955) pointed out the usefulness of the exterior opening in the pored lateral line scales and number of scale rows as taxonomic characters. In addition, Hughes (1981) commented that the morphology of the pored lateral line scale ctenii also had potential taxonomic value, owing to the variation among different platycephalid species.

Key to the Species of *Grammoplites*

- 1a. Number of gill rakers on the lower arch usually 5 or fewer 2
- b. Number of gill rakers on the lower arch usually 7 or more 3
- 2a. Interorbital width 9.8–13.1% of head length.. *G. scaber*
- b. Interorbital width 6.4–8.4% of head length....

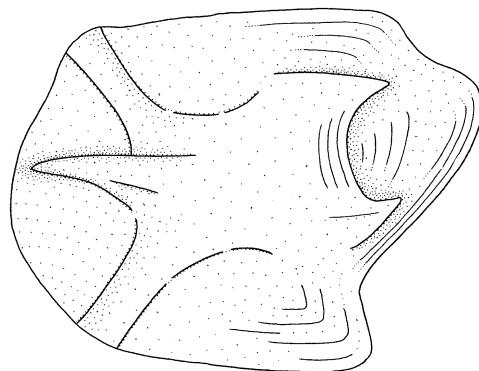


Fig. 7. Single lateral line scale from midbody region on right side of *Grammoplites gruveli*, BMNH 1914.2.2, 128.6 mm SL. Scale bar indicates 1 mm.

- *G. knappi*
- 3a. Uppermost preopercular spine reaching posterior margin of opercle *G. suppositus*
 - b. Uppermost preopercular spine not reaching posterior margin of opercle 4
 - 4a. Papillae on lips *G. portuguesus*
 - b. No papillae on lips *G. gruveli*

Comparative Materials

Grammoplites scaber Linnaeus: CAS 82625, 20 specimens, 145.8–214.3 mm SL, Thailand ($13^{\circ}20'00''N$, $100^{\circ}45'15''E$), 1–10 m, 7–9 Dec. 1957; FUMT-P 8538, 172.6 mm SL, fish market, Yanawa, Bangkok, Thailand, 16 Feb. 1985; URM-P 29702, 126.7 mm SL, fish market, Phuket, Thailand, 2 Oct. 1991; URM-P 29725–29727, 3

specimens, 160.8–192.8 mm SL, fish market, Phuket, Thailand, 8 Dec. 1991; URM-P 29730, 242.6 mm SL, Phuket, Thailand, 12 Dec. 1991. Unregistered specimen, 142.4 mm SL, Thailand, date unknown.

Grammoplites gruveli Pellegrin: BMNH 1914.2.2: 56, 57, 58, 3 specimens, 106.4–132.8 mm SL, Lagos, western coast of Africa, 2 Feb. 1914.

Acknowledgments

We are deeply indebted to Dr. Leslie W. Knapp, Smithsonian Oceanographic Sorting Center, for his critical reading of the manuscript, for providing taxonomic information on *Grammoplites scaber*, and for the loan of paratypes of *G. knappi*. We thank Mr. Tetsuo Yoshino, University of the Ryukyus, for the loan and gift of specimens, including paratypes of *G. knappi*, and the loan of specimens of *G. scaber*, Dr. Tomio Iwamoto, California Academy of Sciences, for the loan of paratype of *G. knappi*, the late Dr. E. Trewavas, The Natural History Museum, for the loan of specimens of *G. gruveli*, Dr. Kenji Mochizuki, University Museum, University of Tokyo (now Natural History Museum and Institute, Chiba), for the loan of the specimens of *G. scaber*, and Dr. W. Smith-Vaniz, Academy of Natural Sciences of Philadelphia, for providing data on and a radiograph of the holotype of *G. jacksoni*. We are also grateful to Dr. Ken-ichiro Kyushin and the crew of T/V "Oshoro Maru," Faculty of Fisheries, Hokkaido University, for their collecting of the holotype off Borneo and Mr. Mitsuhiro Sakashita, Okinawa Kurumaebi (Prawn) Co., Ltd., for his collecting of specimens, including paratypes of *G. knappi*, and provision of colour photographs and taxonomic information on *G. knappi* and *G. scaber*.

Literature Cited

- Böhlke, E. B. 1984. Catalogue of type specimens in the ichthyological collection of the Academy of Natural Sciences of Philadelphia. Acad. Nat. Sci. Phil. Spec. Publ. 14. vii+246 pp.
- Fowler, H. W. 1904. A collection of fishes from Sumatra. J. Acad. Nat. Sci. Phila., Ser. 2, 12: 497–560.
- Fowler, H. W. 1944. Fishes obtained in the New Hebrides by Dr. Edward L. Jackson. Proc. Acad. Nat. Sci. Philad., 96: 155–199.
- Hubbs, C. L. and K. F. Lagler. 1958. Fishes of the Great Lakes region. Bull. Cranbrook Inst. Sci., 26: 1–213.
- Hughes, D. R. 1981. Development and organization of the posterior field of ctenoid scales in the Platycephalidae. Copeia, 1981: 596–606.
- Knapp, L. W. 1979. Fische des Indischen Ozeans. Ergebnisse der ichthyologischen Untersuchungen während der Expedition des Forschungsschiffes 'Meteor' in den Indischen Ozean, Oktober 1964 bis 1965. A. Systematischer Teil, 22. Scorpaeniformes (4). Meteor Forsch.-Ergebnisse (Biol.), 29: 48–54.
- Knapp, L. W. 1986. Family No. 155: Platycephalidae. Pages 482–486 in M. M. Smith and P. C. Heemstra, eds. Smith's sea fishes. Springer-Verlag, Berlin.
- Linnaeus, C. 1758. Systema Naturae, 10th ed. Brit. Mus. (Nat. Hist.), London. 824 pp.
- Matsubara, K. and A. Ochiai. 1955. A revision of the Japanese fishes of the family Platycephalidae (the flat-head). Mem. Coll. Agri. Kyoto Univ., (68): 1–109.
- Pellegrin, J. 1905. Mission des pêches de la côte occidentale d'Afrique dirigée par M. Gruvel. Poissons. Bull. Soc. Zool. France, 30: 135–141.
- Smith, J. L. B. 1953. Fishes taken in the Mozambique Channel by Mussolini P. Fajardo. Mem. Mus. Dr. Alvaro de Castro, 2: 5–20, 3 figs., 1 pl.
- Troschel, F. H. 1840. Über einige Bloch'sche Fisch-arten. Arch. Naturgesch., 6: 267–281.

南シナ海から得られたコチ科魚類の1新種 *Grammoplites knappi*

今村 央・尼岡邦夫

南シナ海（ボルネオ島沖、タイ湾およびハイナン島）から採集された標本に基づき、コチ科魚類の1新種 *Grammoplites knappi* を記載した。本種は鰓耙数が少ないとこと（1+4–5=5–6）、両眼間隔幅が狭いこと（両眼間隔幅は頭長の 6.4–8.4%）、眼径が大きいこと（眼径は頭長の 18.6–20.7%）、前鰓蓋骨最上棘が鰓蓋後部に達しないこと、口部に皮弁を持たないこと、側線鱗の後部の感覺口が 1 個であること、側線鱗の後部に櫛鱗を持つことから他の本属魚類から識別される。

（今村：〒040 函館市杉並町 23–11 遺愛女子高等学校；尼岡・今村（現住所）：〒041 函館市港町 3–1–1 北海道大学水産学部水産動物学講座）